

Bimetallic core-satellites single nanoprobe for the detection of Pb²⁺ ion

이수승, 정선일¹, 정의근¹, 홍수린, 양영인, 송현돈, 최인희²,
강태욱¹, 이종협*
서울대학교; ¹서강대학교; ²Cornell University
(jyi@snu.ac.kr*)

The accurate detection of metal ions is important, since they can have harmful effects on the environment and human health. In this research, bimetallic core-satellites nanoprobe was developed for the precise detection of Pb²⁺ ion. Core and satellite metallic nanoparticles was linked with each other by DNAzyme/substrate RNA complex which shows enzymatic activity with Pb²⁺ ion. In the presence of Pb²⁺ ions, substrate RNA can be cleaved into two fragments by the enzymatic reaction and the satellite nanoparticles are detached from a core nanoparticle. From the structural change, the contents of Pb²⁺ ion can be measured by tracking a change of dielectric function of the nanoprobe. Bimetallic core-satellites nanoprobe shows a highly sensitive detection performance, because that structural change of bimetallic nanoprobe can cause a larger change of dielectric functions than that of single nanoprobe due to the interparticle plasmon coupling effect. Moreover, detection area can be reduced so far as one single nanoparticle via dark-field microscopy, scattered spectrum can give precise information according to the structural change without ensemble average.